NASA SBIR/STTR Technologies

T1.01-9949 - High Performance Nanolauncher

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Identification and Significance of Innovation

ORBITEC is developing the Low Cost Nanolauncher (LCN) sounding rocket to lower small payload launch costs. This vehicle is the first step toward a low cost orbital vehicle. Cost reduction is achieved by reducing the complexity of the vehicle and using commercial grade components. Propellant feed systems will be simplified by using self pressurizing propellants to eliminate the need for pumps or separate pressurization tanks. ORBITEC's vortex cold wall technology will simplify combustion chamber design. The combination of these technologies and design practices will produce a vehicle with modest performance, but much lower design, fabrication, and operational costs than conventional liquid rockets able to perform the same task. Current launch capabilities for small payloads (both sub-orbital and orbital) are insufficient to meet demands for availability, schedule flexibility, and lower cost. The Low Cost Nanolauncher will satisfy this need.

Estimated TRL at beginning and end of contract: (Begin: 5 End: 7)

Technical Objectives and Work Plan

The Phase I work will unite several new technologies and demonstrate their viability in a sounding rocket. The Low Cost Nanolauncher (LNC) will be designed, built, and ground tested. Trajectory simulations will be performed to size the LCN as the second stage for a future orbital vehicle. Testing will characterize the engine performance and show its survivability over a full duration burn. Successful tests will result in a launch early in Phase II, followed by the development of an orbital launch vehicle. The Phase I work will include the following tasks:

-Vehicle Requirements Refinement
-Design and Fabrication of Prototype Engine
-Design and Fabrication of Prototype Electronics
-Ground Test of Prototype Engine
-Design of Sounding Rocket
-Design of Flight Engine
-Fabrication of Sounding Rocket
-Ground Test of Sounding Rocket

NASA Applications

The direct result of the Phase I work will be an inexpensive sounding rocket for use in atmospheric and near space research. It will also provide a means of flight testing nano-satellites and small components to increase their TRL. The inexpensive propulsion system developed in this work will be valuable for other small vehicles. An orbital vehicle based on the Low Cost Nanolauncher will allow NASA to deploy small payloads to orbit on a flexible schedule with low operation costs.

Non-NASA Applications

The military and commercial and academic researchers will benefit from the affordable, rapid turnaround, nano-sat launch services made possible by the LCN. A sounding rocket based on this work will provide low cost access to the upper atmosphere, space, or microgravity. The novel propulsion system will also be marketable to vehicle developers looking for less expensive propulsion alternatives.

Firm Contacts

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